

BMP #30 - Earth Dike

Targeted Pollutants

- ☒ Sediment
- ☐ Phosphorus
- ☐ Trace metals
- ☐ Bacteria
- ☐ Petroleum hydrocarbons

Physical Limits

Drainage area 10 ac
Max slope 10%
Min bedrock depth 5 ft
Min water table 5 ft
SCS soil type ABC
Freeze/Thaw Fair
Drainage/Flood control yes

DESCRIPTION

An earth dike is a temporary berm or ridge (or ridge-and-channel combination) of compacted soil located in a manner to channel water to a desired location. Earth dikes are used to protect work areas from upslope runoff and to divert sediment-laden water to appropriate traps or stable outlets. The channel portion (if used) generally has a lining of stone, riprap, or vegetation for stabilization.

APPLICATIONS

Earth dikes are used in construction areas to control erosion, sedimentation, or flood damage. Earth dikes can be used in the following situations:

- Across unprotected slopes, as slope breaks, to reduce length.
- Below slopes to divert excess runoff to stabilized outlets.
- At or near the perimeter of the construction area to keep sediment-laden runoff from leaving the site.
- To protect cut or fill slopes by diverting upslope flows away from disturbed areas to a stabilized outlet.
- To direct any sediment-laden runoff to a sediment-trapping device.
- To direct clean water away from disturbed areas

LIMITATIONS

- Despite an earth dike's simplicity, improper design can limit its effectiveness.
- Frequent inspection and maintenance are essential to the proper performance of this BMP.
- When the drainage area above the earth dike is greater than 10 acres (4 hectares), consult the United States Department of Agriculture - Soil Conservation Service (USDA-SCS) standards and specifications for diversions.

DESIGN PARAMETERS

The earth dike shall be constructed of compacted soil or coarse aggregate according to the following criteria:

SUGGESTED DIKE DESIGN CRITERIA		
Criteria	Drainage area under 5 acres (2 hectares)	Drainage area between 5 to 10 acres (2 to 4 hectares)
Dike Height	18 in (.53 m)	3 ft (1.0 m)
Dike Width	2 ft (0.6 m)	3 ft (1.0 m)
Flow Width	4 ft(1.3 m)	6 ft (2.0 m)
Flow Depth in channel	8 in (0.2 m)	15 in (0.4 m)
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% - 20%	0.5% - 20%

The channel formed behind the dike should have a positive grade to a stabilized outlet. The channel should be stabilized with vegetation or other stabilization measures.

Grades over 10 percent may require site-specific design developed or approved by a registered engineer.

CONSTRUCTION GUIDELINES

Some general considerations include proper compaction of the earth dike, appropriate location to divert the intercepted runoff, and proper ridge height and thickness. Earth dikes should be constructed along a positive grade. Other than the discharge point, there should be no dips or low points where stormwater will collect.

Runoff intercepted from disturbed areas should be diverted to a sediment-trapping device. Runoff from undisturbed areas can be channeled to an existing swale or to a level spreader. Stabilization for the dike and flow channel (or drainage swale) should be stabilized as soon as possible. Stabilization materials can include vegetation, stone, or riprap.

Where: Construct the dike where it will not interfere with major areas of construction traffic so that vehicle damage to the dike will be kept to the minimum.

When: Install the dike prior to the majority of soil disturbing activity. The dike may be removed when stabilization of the drainage area and outlet are complete.

Site preparation: Clear the area of all trees, brush, stumps, or other obstructions.

Construction: Construct the dike to the designed cross-section, line and grade making sure that there are no irregularities or bank projections to impede the flow. Construct the connecting portion to any stream channel last.

Compaction: The dike should be compacted using earth moving equipment (to prevent failure of the dike).

Stabilization: The dike must be stabilized at least 10 days after installation. The flow channel shall be stabilized according to the following criteria:

Type of treatment	Channel grade (percent)	Flow channel A (less than 5 acres)	Flow channel B (5-10 acres)
1	0.5-3.0	Seed and Straw Mulch	Seed and Straw Mulch
2	3.1-5.0	Seed and Straw Mulch	Seed and cover with Jute or Excelsior; Sod, or line with 2" stone
3	5.1-8.0	Seed and cover with Jute or Excelsior; Sod, or line with 2" stone	Line with 4-8"stone or Recycled Concrete Equivalent
4	8.1-20	Line with 4-8"stone or Recycled Concrete Equivalent	Engineering Design

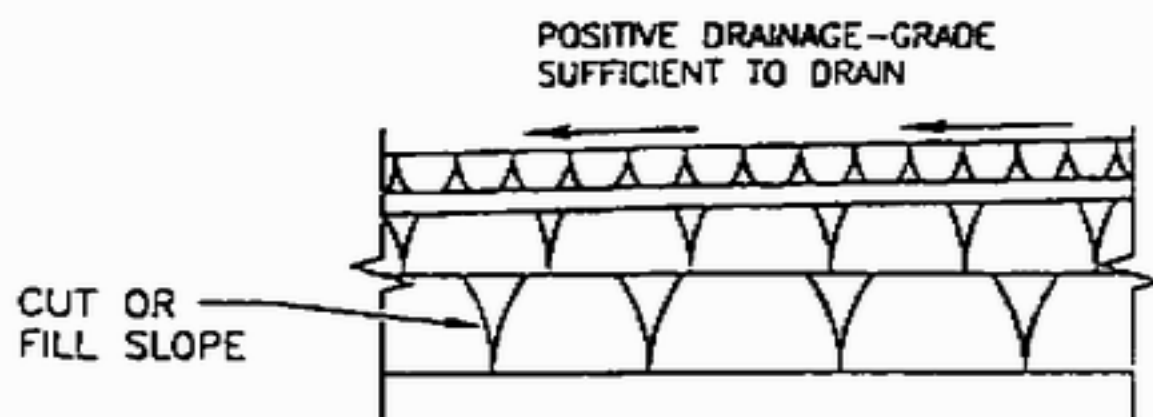
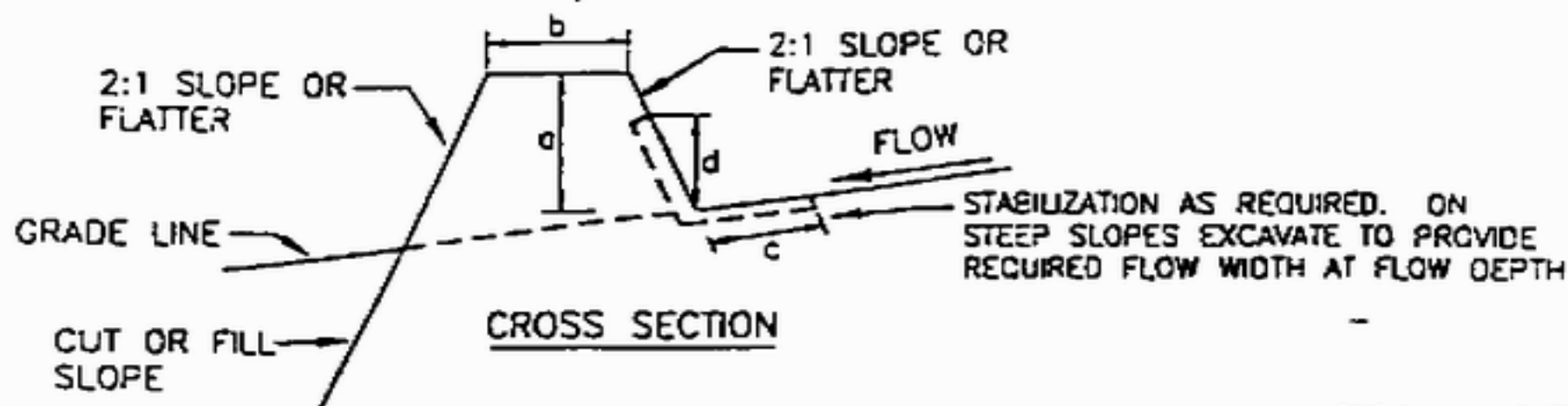
a Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

In highly erodible soils, as defined by the Soil Survey (NRCS/SCS) of the project's county, refer to the next higher slope grade for type of stabilization.

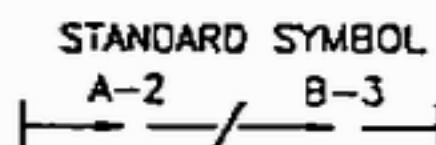
Outlet: Earth dikes shall have an outlet that functions with a minimum of erosion. Runoff shall be conveyed to a sediment trapping device until the drainage area above the dike is adequately stabilized. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

MAINTENANCE

- Inspect diversion dikes regularly and after every storm. Make any repairs necessary to ensure they are in good working order.
- Inspect the dike, flow channel and outlet for deficiencies or signs of erosion.
- If material must be added to the dike, be sure it is properly compacted.
- Reseed/stabilize the dike as needed to maintain its stability regardless if there has been a storm event or not



	DIKE A (3 ac. or less)	DIKE B (5-10 ac.)
a—DIKE HEIGHT	18"	36"
b—DIKE WIDTH	24"	36"
c—FLOW WIDTH	4'	6'
d—FLOW DEPTH	8"	15"



CONSTRUCTION SPECIFICATIONS

- 1 ALL DIKES SHALL BE COMPACTED BY EARTH-MOVING EQUIPMENT.
- 2 ALL DIKES SHALL HAVE POSITIVE DRAINAGE TO AN OUTLET.
- 3 TOP WIDTH MAY BE WIDER AND SIDE SLOPES MAY BE FLATTER IF DESIRED TO FACILITATE CROSSING BY CONSTRUCTION TRAFFIC.
- 4 FIELD LOCATION SHOULD BE ADJUSTED AS NEEDED TO UTILIZE A STABILIZED SAFE OUTLET.
- 5 EARTH DIKES SHALL HAVE AN OUTLET THAT FUNCTIONS WITH A MINIMUM OF EROSION. RUNOFF SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE SUCH AS A SEDIMENT TRAP OR SEDIMENT BASIN WHERE EITHER THE DIKE CHANNEL OR THE DRAINAGE AREA ABOVE THE DIKE ARE NOT ADEQUATELY STABILIZED.
- 6 STABILIZATION SHALL BE: (A) IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR SEED AND STRAW MULCH OR STRAW MULCH IF NOT IN SEEDING SEASON, (B) FLOW CHANNEL AS PER THE CHART BELOW.

FLOW CHANNEL STABILIZATION

TYPE OF TREATMENT	CHANNEL GRADE	DIKE A	DIKE B
1	0.5-3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1-5.0%	SEED AND STRAW MULCH	SEED USING JUTE OR EXCELSIOR; 500; 2" STONE
3	5.1-8.0%	SEED WITH JUTE OR 500; 2" STONE.	LINED RIP-RAP 4"-8"
4	8.1-20%	LINED RIP-RAP 4"-8"	ENGINEERING DESIGN
A. STONE TO BE 2 INCH STONE, OR RECYCLED CONCRETE EQUIVALENT, IN A LAYER AT LEAST 3 INCHES IN THICKNESS AND BE PRESSED INTO THE SOIL WITH CONSTRUCTION EQUIPMENT. B. RIP-RAP TO BE 4-8 INCHES IN A LAYER AT LEAST 8 INCHES IN THICKNESS AND PRESSED INTO THE SOIL. C. APPROVED EQUIVALANTS CAN BE SUBSTITUTED FOR ANY OF THE ABOVE MATERIALS.			
7	PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.		